REMARKS

At the outset, Applicant thanks the Examiner for the thorough review and consideration of the subject application. The Non-Final Office Action of November 5, 2003 has been received and its contents carefully reviewed.

Claims 1-20 remain pending in the present application, where Applicant has amended claims 1, 9-12, and 14-20. In view of the following remarks, Applicant requests consideration and allowance of the claims.

In the Office Action, the Examiner objected to the drawings, specifically stating that Figure 1 should be designated by a legend such as "Prior Art." Applicant hereby amends Figure 1, designating it as "Prior Art", and respectfully requests that the present objection to the drawings be withdrawn.

In the Office Action, the Examiner rejected claims 1-6, 8, 9, 11, 12, 16, 17, and 20 under 35 U.S.C. § 102(b) as allegedly being anticipated by Fraas (U.S. Patent No. 4,451,691). This rejection is respectfully traversed and reconsideration is requested.

Applicant notes that claim 13 was not rejected under 35 U.S.C. § 102(b) as allegedly being anticipated by Fraas, but that claims 16, 17, and 20, which depend from claim 13, were. Claims 16, 17, and 20 depend from claim 13 and, therefore, include all of the elements of claim 13. Accordingly, Applicant respectfully submits claims that 16, 17, and 20 cannot be anticipated by Fraas under 35 U.S.C. § 102(b).

Further, Applicant respectfully submits that claim 1 is patentable over Fraas in that claim 1 recites, "A method of fabricating a tunnel junction of a vertical cavity surface emitting laser (VCSEL), comprising... growing a tunnel junction including $GaAs_{(1-x)}Sb_x$...." Fraas fails to teach, either expressly or inherently, at least this feature of the claimed invention.

In rejecting independent claim 1, the Examiner cites Fraas as allegedly disclosing "a GaAsSb layer grown on a substrate using the MOCVD process (col.4, l.37-45) with the temperature between 500 and 650 degrees (col.2, l.63-64)." Assuming *arguendo* that Fraas actually discloses what is alleged by the Examiner, Applicant respectfully submits Fraas fails to

teach, for example, a tunnel junction of a VCSEL including $GaAs_{(1-x)}Sb_x$, as presently claimed.

A "tunnel junction" of a VCSEL (e.g., a device that converts electrons into photons) refers to a particular known structure having a definite function, i.e., a tunnel junction of a VCSEL converts electrons into holes that are injected into an active region, whereby the holes are subsequently converted into photons within the active region (see, for example, paragraph [004] and [006] of the present application for an illustrative functional description of tunnel junctions). Contrary to the principles of the present invention, Fraas relates to multicolor photovoltaic solar cells (e.g., a device that converts photons into electrons) (see, for example, Fraas at column 1, lines 14-16). Moreover, the "GaAsSb layer" in Fraas, as cited by the Examiner actually constitutes a first homojunction layer 14 formed on substrate 12 of a two-color solar cell shown in Figure 2 (see, for example, Fraas at column 4, line 22 - column 5, line 10). Fraas does not teach, suggest, or mention a tunnel junction. Accordingly, Applicant respectfully submits that Fraas fails to set forth, either expressly or inherently, each and every element as set forth in claim 1 and requests withdrawal of the present rejection under 35 U.S.C. § 102(b).

It should be noted that claim 8 has not been amended, and it recites a tunnel junction comprising a p-doped $GaAs_{(1-x)}Sb_x$ layer. Claim 8 cannot be anticipated by Fraas at least for the reasons set forth above with respect to the rejection of claim 1. Accordingly, the arguments presented above with respect to the rejection of claim 1 are equally applicable to the rejection of claim 8.

For at least the reasons set forth above, Applicant respectfully contends that independent claims 1 and 8 as well as claims 2-6 and 9-12, which variously depend therefrom, in addition to claims 16, 17, and 20, are patentable over Fraas. Consequently, the Applicant requests that the Examiner withdraw the rejection of claims 1-6, 8-12, 16, 17, and 20 under 35 U.S.C. § 102(b).

In the Office Action, the Examiner rejected claim 7 under 35 U.S.C. § 103(a) as allegedly being unpatentable over Fraas in view of Tsukada (U.S. Patent No. 4,430,151). This rejection is respectfully traversed and reconsideration is requested.

Claim 7 depends from independent claim 1 and, therefore, includes all of the method steps set forth in claim 1, including the step of forming a tunnel junction including $GaAs_{(1-x)}Sb_x$. As described above Fraas fails to teach at least the aforementioned step of forming a tunnel junction including $GaAs_{(1-x)}Sb_x$. Even if Tsukada discloses the various elements asserted by the Examiner, Applicant respectfully submits that Tsukada fails to cure the aforementioned deficiency of Fraas with respect to claim 1. Accordingly, Applicant submits that claim 7 is patentable over Fraas in view of Tsukada by virtue of its dependence from claim 1 and requests withdrawal of the present rejection under 35 U.S.C. § 103(a).

In the Office Action, the Examiner rejected claims 10, 13-15, 18, and 19 under 35 U.S.C. § 103(a) as allegedly being unpatentable over the related art shown in Figure 1 of the present application in view of Fraas. This rejection is respectfully traversed and reconsideration is requested.

As a preliminary matter, Applicant notes that claim 10 depends from claim 8, which was rejected as allegedly being anticipated by Fraas. Accordingly, for purposes of clarifying the prosecution history, Applicant hereby assumes the Examiner intended to reject claim 10 as allegedly being unpatentable over Fraas in view of the related art shown in Figure 1 of the present application.

Claim 10 depends from independent claim 8 and, therefore, includes at least the aforementioned features set forth in claim 8, i.e., a tunnel junction including $GaAs_{(1-x)}Sb_x$. As described above, Fraas fails to teach a tunnel junction, and more specifically a tunnel junction including $GaAs_{(1-x)}Sb_x$. The related art shown in Figure 1 of the present application does show a tunnel junction. However, it fails to show a tunnel junction including $GaAs_{(1-x)}Sb_x$. Therefore, together, Fraas and the related art shown in Figure 1 fail to disclose all of the required features of claim 10. Accordingly, Applicant submits that claim 10 is patentable over Fraas in view of the related art shown in Figure 1 by virtue of its dependence from claim 1 and requests withdrawal of the present rejection under 35 U.S.C. § 103(a).

In a similar manner as to claims 1 and 8, claim 13 requires a tunnel junction over an active region, wherein the tunnel junction includes a $GaAs_{(1-x)}Sb_x$ layer. Accordingly, the arguments presented above with respect to the rejection of claims 1 and 8 are equally applicable

to the rejection of claim 13.

Further, the Examiner rejected claim 13 by first citing the related art shown in Figure 1 of the present application as showing "a VCSEL comprising an InGaAsP active region," but not "a GaAsSb layer." In attempting to cure this deficiency, the Examiner cites Fraas as allegedly teaching "a GaAsSb layer (col.4, l.37)." The Examiner then concludes that, "[f]or the benefit of a VCSEL, it would have been obvious... to provide the... [related art shown in Figure 1] a GaAsSb layer as taught by... [Fraas]."

As the Examiner is no doubt aware, obviousness can only be established by combining or modifying the teachings of references to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art. The teaching or suggestion to make the claimed combination cannot be based on the Applicant's disclosure. See M.P.E.P. § 2142. As acknowledged in § 2142, "[t]he tendency to resort to 'hindsight' based upon applicant's disclosure is often difficult to avoid... [h]owever, impermissible hindsight must be avoided and the legal conclusion [of obviousness] must be reached on the basis of the facts gleaned from... [the applied references or knowledge generally available to those of ordinary skill in the art]."

In stating that it would have been obvious to combine the related art shown in Figure 1 with Fraas "[f]or the benefit of a VCSEL", the Examiner's stated motivation to combine is based on the Applicant's disclosure; it amounts to hindsight reconstruction and it is, therefore, an impermissible and inappropriate basis for obviousness.

For at least the reasons set forth above, Applicant respectfully contends that independent claim 13, as well as 14, 15, 18 and 19, which depend therefrom, are patentable over the related art shown in Figure 1 of the present application in view of Fraas. Consequently, the Applicant requests that the Examiner withdraw the rejection of claims 13-15, 18, and 19 under 35 U.S.C. § 103(a).

If the Examiner deems that a telephone conversation would further the prosecution of this application, the Examiner is invited to call the undersigned at (202) 496-7500.

If these papers are not considered timely filed by the Patent and Trademark Office, then a petition is hereby made under 37 C.F.R. §1.136, and any additional fees required under 37 C.F.R. §1.136 for any necessary extension of time, or any other fees required to complete the filing of this response, may be charged to Deposit Account No. 50-0911. Please credit any overpayment to deposit Account No. 50-0911. A duplicate copy of this sheet is enclosed.

Dated: February 5, 2004

Respectfully submitted,

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